

Appl No.: 10/623,227  
Reply to Office Action of October 05, 2006

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### REMARKS/ARGUMENTS

Favorable consideration of this application is respectfully requested. The amendments to claims do not require further consideration or search, since dependent claims have been incorporated into the relevant independent claims.

The present application is a divisional of parent application Serial No. 09/851,025, filed May 08, 2001, now U.S. Patent 6,653,005, which claims the benefit of priority from U.S. Provisional Application Serial No. 60/203,370, filed May 10, 2000 and included Claims 1 – 43. When the present divisional application, Serial No. 10/623,227 was filed July 18, 2003, Applicant elected to cancel Claims 1 – 36 and to prosecute Claims 37-43.

In a telephone conversation with Applicant's attorney on April 13, 2006, a restriction requirement and an election was required for one invention in Claims 37-40 or another invention in Claims 41-43; a provisional election was made with traverse to prosecute Claims 37 – 40. Claims 41-43 are now canceled by Applicant's amendment filed August 01, 2006; Claims 37-40 were pending at the time of this Final Action.

In the present amendment, after the Final Action mailed on October 05, 2006, Applicant amends independent claims 37 and 39 by incorporating the substance of dependent claims 38 and 40, respectively. Support for the amendments to Claim 37 is found in the original dependent claim 38; in the specification at page 19, lines 4-22; page 20, lines 9 – 20; Example 8. Support for the amendments to Claim 39 is found in the original dependent claim 40; in the specification at page 19, lines 14 – 22; page 20, lines 11-20 and Example 8. Claims 38 and 40 are now canceled. No new matter has been added.

Favorable reconsideration is earnestly solicited in view of the following remarks directed to each enumerated paragraph in the Final Action of October 05, 2006.

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In paragraph 1 of the Final Action of October 05, 2006, the Examiner states that the information disclosure statement filed 8/1/06 has not been considered because no fee was paid. Applicant encloses with this Amendment a Credit Card Authorization form in the amount of \$180.00 to pay the late submission fee for the information disclosure statement.

In paragraph 2 of the Final Action of October 05, 2006, the Examiner states that "[a] new title is required that is clearly indicative of the invention to which the claims are directed." Applicant's Amendment to the Specification at page 2 of this paper, provides a clearly descriptive title that reflects the subject matter of Claims 37 and 39. Support for this new title is found in original claims 37-40, on page 19, lines 4-22, and on page 20, lines 9-22 of the specification.

In paragraph 3 of the Final Action of October 05, 2006, the Examiner rejects Claims 37 and 38 under 35 U.S.C. 112, second paragraph, as being indefinite because the phrase "and from ...nanofibers" is unclear as to what the thickness is. Applicant has eliminated this language and states clearly that the carbon filaments are approximately one micron in mean diameter. Support for the thickness measurement is found in the original claim 37 and in the specification on page 19, lines 15-16. Accordingly, Applicant requests the withdrawal of the rejection of amended claim 37. The rejection of canceled claim 38 is now moot.

Also in paragraph 3 of the Final Action of October 05, 2006, the Examiner rejects Claims 37 and 38 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Evans et al., "Growth of Filamentary Carbon on Metallic Surfaces . . ." Carbon (1973), Vol. 11, 441-445 (a newly cited reference). Applicant has amended Claims 37 and 39 to require that the catalyst used in the formation of "octopus-like carbon particles" be selected from carbon black or activated charcoal. Metallic catalysts or supports are not claimed in the formation of carbon filaments of the present invention. In fact, in the specification at page 19, lines 7-14,

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Applicant acknowledges that it is well known to use transition metal catalysts to produce carbon filaments or nanofibers during catalytic decomposition of hydrocarbons and the Evans et al. reference confirms the statements in Applicant's specification. Evans et al. does not teach, suggest or make obvious the use of non-metallic catalysts. In fact, Evans et al. describe the production of carbon filaments produced by decomposition of methane and acetone over metallic (iron nickel, stainless steel) surfaces. In contrast, in the subject invention, the carbon filaments are produced by thermal decomposition of methane and other hydrocarbons over carbon surfaces (carbon black, activated charcoal) and, preferably by passing electric current through the carbon catalyst. As a result, the carbon filaments produced have a relatively large diameter (about 1 micron) and an octopus-like shape without any metal particles incorporated within the structure.

Applicant distinguishes the present invention from the prior art by providing the details of physical properties and method of production for the novel carbon fibers produced without metallic catalysts.

It was not known prior to Applicant's invention that carbon filaments or fibers, approximately 1 micron in mean diameter, with "octopus"-like structure, could be produced during the thermocatalytic decomposition of hydrocarbons in the presence of carbon black or activated charcoal catalysts and the carbon fibers so produced can be used for the clean-up of oil spills on the surface of water. This inventive concept is now claimed in the amended independent claim 37. Since the rejection of canceled claim 38 is moot, Applicant respectfully requests the withdrawal of the rejection of claim 37 under 35 U.S.C. 103(a) as obvious over Evans et al.

In paragraph 4 of the Final Action of October 05, 2006, the Examiner rejects claims 37 and 38 under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nishimura et al. (U.S. Patent 6,103,373). The Examiner argues that Nishimura

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teaches carbon particles having an "octopus"-like structure made up of carbon fibers having diameters of 0.1-5 microns . . . bonded to a carbon center, grown by chemical vapor deposition (CVD) and according to Figure 3, the fibers appear to be hollow and absent being functionalized with hydrophilic groups post-production, are inherently hydrophobic.

Applicant respectfully disagrees with the Examiner's characterization of the teachings in Nishimura. First, Nishimura forms carbon fibers via CVD; that is not equivalent to the thermocatalytic decomposition of hydrocarbons used by Applicant. Secondly, the "octopus"-like structure obtained by Nishimura is obtained by compressing the fibers to create a "press formed structure." See Nishimura '373 column 4, lines 51-52. Such an action would certainly eliminate any hollow fibers. In contrast, Applicant does not press the fibers into an "octopus"-like structure and relies on the hollow structures to compliment the hydrophobic nature of the carbon surface and act as a "sponge" to readily adsorb oil on the surface of water.

Thus, Nishimura does not teach, suggest or make obvious the production of carbon filaments or fibers, approximately 1 micron in mean diameter, with an "octopus"-like structure, produced in the presence of carbon black or activated charcoal during the thermocatalytic decomposition of hydrocarbons wherein the carbon fibers so produced are used for the clean-up of oil spills on the surface of water. Since the rejection of claim 38 is moot, Applicant respectfully requests that the rejection of claim 37 under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nishimura et al. (U.S. Patent 6,103,373) be withdrawn.

In paragraph 5 of the Final Action of October 05, 2006, the Examiner rejects claims 37 and 38 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Egashira et al. (1983). The Examiner argues that "Egashira teaches carbon particles

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that are made up of multiple hollow graphitic carbon fibers of substantially uniform length with diameters of 1 – 10 microns, wherein the multiple fibers are attached to a carbon bead.” The Examiner also repeats an earlier argument that if the “. . . carbon fibers are not functionalized with hydrophilic groups post-production, [they] are inherently hydrophobic. . .”

Applicant has admitted in the specification at page 20, lines 13-16 that “the invention takes advantage of the . . . distinct hydrophobic nature of the carbon surface, . . .” However, with regard to the complete teachings of Egashira, the Examiner has glossed over the most important details and provides a general description of the graphitic carbon fibers produced by Egashira using vapor phase growth of carbon fibers NOT the thermocatalytic decomposition of hydrocarbons using carbon black or activated charcoal as the catalysts, as described and claimed by Applicant.

Egashira also uses carbon beads with 2.5 wt. percent sulfur and requires that the catalyst used in the vapor phase growth of carbon fibers be a “carbonaceous material that contains relatively high amounts of sulfur.” See page 92, last sentence of journal article. In contrast, Applicant uses thermocatalytic decomposition of hydrocarbons over carbon black or activated charcoal catalysts (containing NO sulfur) which are heated by electric current.

Egashira also teaches that the carbon fibers are “sea-urchin, chestnut-burr type particles” NOT shaped like Applicant’s “octopus”-like structures with hollow fibers and hydrophobic sponge like properties for adsorbing oil film on water surfaces. The “octopus”-like structure with hollow fibers is a significant feature for the functional use of cleaning up oil spills, which is claimed in the present invention.

A person skilled in the art would not find Egashira’s teachings suggestive or instructive in the production of carbon filaments or fibers, approximately 1 micron in mean diameter, with an

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“octopus”-like structure, produced in the presence of carbon black or activated charcoal during the thermocatalytic decomposition of hydrocarbons wherein the carbon fibers so produced are used for the clean-up of oil spills on the surface of water.

In paragraph 6 of the Final Action of October 05, 2006, the Examiner rejects claims 39 and 40 under 35 U.S.C. 103(a) as being unpatentable over Murata et al. (U.S. Patent 5,650,132) in view of Lee (U.S. Patent 4,292,505), Chung (U.S. Patent 5,643,670) and Egashira et al. First, Applicant has canceled claim 40, therefore, the rejection of claim 40 is considered moot.

With regard to claim 39, Applicant has amended the method claim to distinguish the invention from each of the references cited either when viewed separately or in combination. It is noted that the Examiner admits that Murata does not teach heating the reactor by putting an electric current through the catalyst; whereas, Applicant requires passing an electric current through the carbon catalyst. The Examiner also admits that Murata does not teach collecting the carbon particles produced on the catalytic material; whereas, Applicant collects the carbon particles and uses them to clean-up oil spills on the surface of water.

The Examiner argues that “. . . Lee uses carbonaceous particles as resistors to heat the furnace to temperatures of at least 1800°C. . .” Lee and Murata both teach using silica filler in the furnace or packed bed reactor; Applicant *does not* use silica. There is no suggestion or teaching that during the thermocatalytic decomposition of hydrocarbons, one could produce carbon filaments or fibers, approximately 1 micron in mean diameter, with an “octopus”-like structure, in the presence of carbon black or activated charcoal wherein the carbon fibers so produced are used for the clean-up of oil spills on the surface of water. Absent a suggestion or directive teaching, it is impermissible to pick and choose teachings out of context or to use Applicant’s invention to assemble references that give a piece-meal rendition of the invention.

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The Examiner argues that “. . . Chung uses metal particles on the carbon-based catalyst.”; Applicant’s claims now specify carbon black and activated charcoal as the catalysts – the specific identification of the catalyst excludes metal particles and such should not be implied. Further, the Examiner cited Chung and Egashira as teaching the usefulness of carbon fibers, stating that “[i]t would have been obvious to one of skill in the art to collect the carbonaceous material deposited to harness a valuable product.” Applicant concurs and has stated in the specification at page 20, lines 7-13, that carbon filaments find applications in many traditional areas. However, the invention discovered by Applicant and now claimed in Claim 39 is not taught, suggested or found in the cited references, either individually or collectively. Applicant respectfully disagrees with the Examiner’s combination of four references to reject Applicant’s invented filamentous carbon particles. The mere fact that someone in the art can arrange parts of a reference to meet the terms of a claim is not sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for someone of ordinary skill in the art, without the benefit of the inventor’s specification to make the necessary combinations and compound syntheses. Ex parte Chicago Rawhide Mfg. Co. 223 USPO 351, 353 (Bd. Pat. App. & Inter. 1984).

There is no teaching, nor suggestion for modifying the references of record to provide the novel filamentous carbon particles of the amended claims. Under well recognized rules of the MPEP (for example, section 706.02(j)), the teaching or suggestion to make the claimed compounds and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. In re Vaeck, 947 F. 2<sup>nd</sup> 488, 20 USPO 2d 1438 (Fed. Cir. 1991).

Applicant provides a method for producing carbon filaments or fibers, approximately 1 micron in mean diameter, with an “octopus”-like structure, produced during the thermocatalytic decomposition of hydrocarbons in the presence of carbon black or activated charcoal catalysts

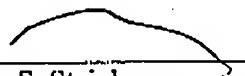
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heated to 850 -- 1220 °C by passing electric current through the catalyst wherein the carbon fibers so produced are used for the clean-up of oil spills on the surface of water. This invention was not known prior to Applicant's disclosure.

The application and claims are believed in condition for allowance in their amended form; allowance of Claims 37 and 39 is respectfully requested. Again, this amendment does not require further consideration and/or search since the dependent claims have been incorporated into the independent claims. Applicant requests entry of the amendments and issuance of a notice of allowance. Alternatively, Applicant respectfully requests the Examiner, with the supervisor, telephone the undersigned attorney to schedule an interview if this amendment does not place the application in condition for allowance.

Respectfully submitted,

  
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Date

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